Statement of
Dr. Hugh L. Dryden, Director
National Advisory Committee for Aeronautics
before
Special Committee on Space and Astronautics
United States Senate
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Mr. Chairman and members of the Committee, and counsel:

Less than 72 hours ago, I was high above the Atlantic ocean, returning from a busy week in Europe. As we flew westward, my thoughts ranged far beyond the comfort of the pressurized cabin, and because they may be pertinent to the matters being considered by your Committee, I should like to mention two of the subjects that came to mind.

My airplane was traveling at an airspeed of more than 300 miles per hour. The earth -- some 20,000 feet below -- was revolving at about 1,000 miles per hour. Simultaneously, the earth was traveling in space, in orbit around the sun, at the rate of about 66,000 miles per hour. At the same time, the sun itself was moving at the rate of 630,000 miles per hour, within our galaxy that we call the Milky Way; the star nearest our sun is Alpha Centauri. It is more than 25 trillion miles away. We have to reach 25,000 miles per hour to escape from the earth. To travel outside the solar system, we will have to escape from the gravitational pull of the sun. That will require a minimum speed of about 70,000 miles per hour. A space craft journey from the earth to Alpha Centauri would take over 40,000 years at this speed. As those increasingly large numbers flashed through my mind, I was reminded, how enormous is the task

ahead, of learning more about our solar system, and the myriad galaxies which comprise the cosmos.

At the same time, I was impressed with the need for urgency, to get on with the job, to use the new tools that we have just fashioned, that for the first time in history enable us to probe the secrets of the universe, to see things as they really are, and to begin man's exploration of space.

The second of my thoughts on my homeward flight was based upon happenings of the previous week. Everywhere I went, especially in Madrid and in Munich, where there were opportunities for conversation with others of the scientific community, I had been met with the following questions: Was the United States really going to provide world leadership in the scientific, peaceful use of our new-found ability to send space craft far beyond the atmospheric envelope that encircles the earth? Would the United States be willing to spend the hundreds of millions annually necessary to accomplish such explorations into space, even if the military advantages were not clearly foreseen and there was no demonstrated prospect of new scientific information that could be immediately translated into dollar-producing projects?

Fortunately, I was prepared for such questioning. I could and did note that our national leaders, in the Administration and in both Houses of Congress, had been virtually unanimous in declaring that the United States should promptly blueprint a wisely bold national space program, and that it should be directed towards exploration and exploitation of space

for peaceful purposes. I told my questioners how the leaders of both the House and the Senate had taken on the task in addition to their already burdensome duties, of studying intensively the ways and means to insure that those intentions should become actualities.

As I flew westward I could not help but think how important it will be that, as a nation, we carry forward these plans for the peaceful use of our new ability to move into space. I realized, of course, and I believe this point of view is shared by even the most anxious of my European friends, that the United States will have to be alert to every possibility of using the new space technology to strengthen our military powers of deterrence. But the important, the vital, point, is that we need to put our national emphasis upon the civil aspects of space technology. The simple fact is, in addition to being a peaceful nation composed of citizens who hate the thought of war, we must so conduct ourselves that our friends around the world -- and our enemies as well -- will know beyond mistake that although we are amply strong as our national interest requires, we are striving by word and deed for peace.

Last week, Dr. James H. Doolittle, Chairman of the National Advisory Committee for Aeronautics, appeared before your Committee. Since my return, I have read his statement and -- except for his comments about me -- I concur completely. I have also reviewed, hurriedly I must admit, the comments of the other gentlemen who testified last week before your Committee.

In the light of that previous testimony, and keeping in mind some of the questions which you gentlemen have asked, I should like now to make several comments that may be helpful, and then attempt to provide answers to such further questions that you may have.

First, may I say I believe that the Administration is far more interested in the accomplishment of a national space program that, except for the space technology efforts of the Military Establishment, will be under civil direction, than it is in the precise language of any part of Senate Bill 3609. In the early stages, when the Administration was studying how best to formulate its national space program, the NACA made recommendations. As I understand it, the bill was purposely written in general, rather than specific, terms because the entire subject of space technology is, and for some time to come will remain, largely an assortment of unknowns. Today, we simply do not know what we will find, or what good it will be, when we venture into space.

There is a distinction between the situation today, respecting space legislation, and the situation at the end of World War II when the Atomic Energy Act was drafted. In that earlier undertaking, the fearful possibilities of atomic energy for military purposes had already been demonstrated. The possibilities of civilian use of atmoic energy were at least partially known. In other words, in 1946 the atomic energy prospects -- what needed to be done respecting both civilian and military research and development, and the necessary precautions that had to be taken -- were

sufficiently clear to make desirable the drafting of legislation in very specific and detailed form. The success of that Congressional effort is apparent from the manner in which, for more than ten years, the Act has stood the test of time. The Atomic Energy Act dealt with problems that were, relatively at least, finite. The problems of the new era of space are more nearly infinite; at the very most, they are largely unknown today. This is why, to the best of my knowledge, the language of the bill was written so flexibly, to permit formulation and prosecution of a wise and vigorous national space program without the necessity of early, major revision of the bill, perhaps on an annual basis.

One of the most difficult problems in the drafting of the legislation for space is how to spell out which of our country's space activities shall be under civilian control and which shall be the responsibility of the Department of Defense. My reading of the earlier testimony before your Committee brings an awareness of a problem that I, who am not greatly experienced in legislative matters, had not anticipated from my reading of the bill.

On page 2, beginning on line 4, the bill states, and I quote, "The Congress further declares that such activities should be directed by a civilian agency exercising control over aeronautical and space research sponsored by the United States, except insofar as such activities may be peculiar to or primarily associated with military systems or military operations, in which case the agency may act in cooperation with, or on

behalf of, the Department of Defense." unquote.

Now, I find, that this language has been interpreted as meaning on the one hand that the role of the National Aeronautics and Space Agency could be reduced to the point of becoming inconsequential and on the other that the Department of Defense could be unduly limited in the development of space technology for military purposes. I believe that the Director of the Budget, Mr. Maurice Stans, will, in his testimony before your Committee later today, make a specific suggestion for a change in wording to clarify the intent of this provision.

Over the 43 years of its existence, the NACA has managed to work closely and well with the Military Services, without being dominated or absorbed by them. Historically, the Armed Services have been first to make use of the aeronautical advances that the researches of the NACA scientists and engineers have made possible. However, the commercial side of aviation has not been overlooked and also has made consistent use of these aeronautical advances, some years after the Military Services.

In the case of space technology, it is my opinion that the requirements of the scientists for data-gathering projects may in many instances be more clearly known than those of the Military Services. In other words, it may well be that the advances we make in our capability to move instruments -- and men -- farther into space, for the accomplishment of scientific missions will prove to be militarily useful.

There has been considerable discussion about the composition of the National Aeronautics and Space Board, and about the fact that, as the bill is presently drafted, the Board will be advisory, rather than governing. It is my understanding, that there were two reasons why the Administration preferred that authority for operation of our national space program be in the hands of a single man, the director of NASA, appointed by the President with the advice and consent of the Senate. These two reasons are: (1) To provide for quicker, more direct action on the space program and (2) to insure that one man could be held fully responsible if the program wasn't going the way it should.

The organic legislation of the NACA stipulates that the composition of the Main Committee shall consist of two representatives each from the Air Force, Navy, and the Civil Aeronautics Authority, and one each from the Smithsonian Institution, the U.S. Weather Bureau, the National Bureau of Standards, and the Department of Defense. In addition, and I quote, "not more than seven other members selected from persons acquainted with the needs of aeronautical science, either civil or military, or skilled in aeronautical engineering or its allied sciences", unquote. More than a year ago, legislation was introduced, to raise the Committee membership to 19, including two from the Army.

Senate Bill 3609 calls for appointment by the President to the Space Board of not more than eight members from Government, with a total membership not to exceed 17. The only stipulation, concerning Government members of the Board, is that at least one shall be from the Department of Defense. Here again, it is my belief that the language was purposely flexible, to permit changes in the Government representation in the nation's civilian space effort when it becomes clearer and more mature. I expect, however, that the Army, Navy, and Air Force will be represented on the Board, as well as the Department of Defense. Similarly, I expect that the Atomic Energy Commission will be represented, because atomic energy almost certainly will be used importantly to power vehicles for space exploration in the years to come. The National Science Foundation will need to be represented, and probably, the U.S. Weather Bureau, because of the

importance of weather observation from satellite stations. That accounts for all but one of the eight Government members. It will be very difficult to provide membership for every Government agency that has interest in space matters, without enlarging the Board.

There is one further point I should like to discuss. The bill has made no specific mention of the very important role of the Atomic Energy Commission in the development of nuclear power for space exploration in the years to come. Under the Atomic Energy Act, the Atomic Energy Commission has developed nuclear power for submarines, ships and electro power generating stations. The submarine, ship, and power station have been the responsibilty of the agencies working in close cooperation with the A. E. C. The A. E. C. is now working on nuclear power for aircraft and of interest for space, rockets. The new space agency would be expected to develop space craft using nuclear power as rapidly as the A. E. C. develops the nuclear components, and the relationship between the two agencies will have to be very close. I have personally recommended increased effort by the A. E. C. in the nuclear rocket program.

To implement the policy declaration, contained in Section 2, objective 6, starting page 2, line 22, of Senate Bill 3609, which reads, quote, "cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in the peaceful application of the results thereof", unquote, the following language is suggested for insertion in the bill:

INTERNATIONAL COOPERATION

"The Agency may, under foreign policy guidance by the Department of State, engage in a program of international cooperation in work done pursuant to this Act, and in the peaceful application of the results thereof, pursuant to agreements negotiated by the Department of State or approved by that Department, " This language has been worked out with the Department of State, and has the approval of that Department and the Bureau of the Budget.

In closing, I should like to quote three sentences from Dr. Doolittle's statement of May 6:- quote, "I have the conviction, and in this I find myself in the company of some very wise men, that a century from now, perhaps much sooner, people will say that this venturing into space that we're planning now was one of the most practical, intelligent investments of our national wealth to be found in history. If we, in the United States, take the wisely bold action necessary to lead in exploiting the possibilities of space technology for science, all mankind will benefit. If Russia wins dominance in this completely new area; well, I think the consequences are fairly plain--probable Soviet world domination, " unquote.

Here, in a very few words, is the reason why we must do what is necessary to lead in space technology.
